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Additional Guidance on Roadmap Proposals

Introduction

On July 18, 2017, the California Energy Commission released an Invitation to Submit Proposals for appliance efficiency standards, test procedures, or other approaches to saving energy for appliances identified in its Phase 2 appliance efficiency rulemaking. For the first time, the Energy Commission has also requested proposals for roadmaps for three appliance types – set-top boxes, solar inverters, and low-power modes and power factor. In this letter, the Energy Commission provides additional guidance on the types of issues that a "roadmap" for these appliance types would address.

Set-top Boxes

In the Invitation to Participate, the Energy Commission identified potential areas of concern and received comments identifying potential key issues for resolving in a roadmap. Based on this feedback, the Energy Commission would like to see proposals for roadmaps that address the following questions:

1. Energy Commission staff is considering aligning with ENERGY STAR® version 5.1 for the scope and definitions. Does this sufficiently capture and distinguish customer premise equipment where the primary purpose is receiving television services (i.e., traditional set-top boxes and display less video gateways) from those where the primary purpose is passing Internet Protocol traffic (i.e., network equipment such as broadband modems and integrated access devices)?

2. Should network equipment be in the scope of the set-top box roadmap or the low-power modes roadmap? Is there a system-based approach that could work within the scope of the set-top box roadmap? Include a rationale for the recommended approach.

3. The ENERGY STAR framework and other existing frameworks rely on base energy allowances plus functional adder allowances. How should allowances for functional adders, and the adders themselves, be reduced over time to reflect evolution and maturation of functions?

4. What milestones are appropriate to get a larger range and variety of set-top boxes to achieve ENERGY STAR v. 5.1 efficiency levels, to increase the installation of set-top boxes that have achieved the v. 5.1 efficiency levels, and on what timeline?

5. The voluntary agreement website at http://www.energy-efficiency.us/ provides links to service provider webpages that list energy usage information for specific

consumer models of set-top boxes. What are additional ways to increase public access to data about the efficiency levels and model numbers of products, both those that meet and do not meet the identified milestones?

6. What are solutions for accelerating the replacement of existing inefficient set-top boxes with efficient set-top boxes installed in homes and business?

7. What utility or state-run programs exist or can be developed to further move the market toward higher efficiency and lower energy consumption ahead of milestones identified in the proposed roadmap?

8. What specific technical barriers exist with respect to development and implementation of low-latency, low-power modes for set-top boxes when compared with other complex electronic devices that have successfully implemented low-power modes that consume substantially less power in sleep mode than in on mode? For example, the *2016 Annual Report* for the voluntary agreement showed that 56 out of 82 set-top boxes have less than a 1.5 watt difference between power consumption in on mode and sleep mode,[1] suggesting that there is an issue in moving set-top boxes to lower power modes when in sleep.

9. How can set-top boxes better achieve a persistent low power standby mode? How are manufacturers and service providers in Europe complying with the standby mode requirements in EC 1275 and EC 801? Do savings from these EC standby mode requirements persist over time or are the actual operational power consumption levels of European set-top boxes in sleep mode similar to those of U.S. set-top boxes in sleep mode?

10. What research and development is needed to improve the efficiency of products within the scope or to address barriers to more widespread market adoption?

11. How can the Energy Commission best get estimates of the number of subscribers or households that use only streaming services from non-service providers or are both a subscriber to a service provider and use streaming services from non-service providers?

12. How can the Energy Commission best get estimates of the increased use of service provider based streaming services?

13. The annual report referenced in #8 above includes modeled, aggregate estimates of stock remaining from prior to 2013.[2] Do these estimates appear reasonable and does this information change strategies or recommendations in your roadmap proposal? How can the Energy Commission received validated, aggregate estimates of stock?

[1] http://www.energy-efficiency.us/library/pdf/STB2016AnnualReport.pdf, pp 27-32.
[2] Ibid., p 22.

14. How can the Energy Commission track whether the milestones that will be established in the Commission's set-top box roadmap are being met?

15. There are several different entities involved in the manufacture, sale, and use of set-top boxes, including manufacturers, cable, telco, and satellite service providers, contractors, and the end-user. How are the costs and benefits associated with improved efficiency in set-top boxes allocated between these different entities?

Solar Inverters

In the Invitation to Participate, the Energy Commission identified potential areas of concern and received comments identifying potential key issues for resolving in a roadmap. Based on the feedback received, the Energy Commission would like to see proposals that address the following key topics:

1. What agencies and organizations are involved with solar inverters and what are their roles and goals with respect to solar inverters?

2. What are the existing drivers for high performance/high efficiency solar inverters? Consider the effects of regulatory requirements, market incentives, and market drivers for performance and efficiency.

3. Is there an existing test procedure or a group of existing test procedures that is adequate for assessing the various efficiency metrics for the range of inverter and module-level power electronics products currently available? If not, is there a recommended approach to either improve the existing test procedures or to develop improved test procedures?

4. What performance attributes are critical for characterizing the various efficiency metrics of inverter and module-level power electronics products currently available?

5. Are there any inverter performance attributes that are critical for grid harmonization that are not expected to be addressed by the California Public Utilities Commission's Smart Inverter Working Group (SIWG)?

6. Are cyber security issues sufficiently addressed by SIWG phase 2 recommendations?

7. SIWG phase 3 efforts are ongoing. How can the Energy Commission account for uncertainty with respect to content and timing of any requirements that are the result of SIWG phase 3 efforts?

8. Does Rule 21 effectively apply statewide? In other words, is it reasonable to assume that the California market will be supplied only with inverters meeting the California Public Utilities Commission's Rule 21 interconnection requirements, or is it likely that inverter manufacturers would supply different products to end-users in California utility territories that are not subject to Rule 21?

9. Is adequate information available to the both the equipment purchaser and equipment owner regarding the various efficiency metrics (conversion, maximum power point tracking, and self-consumption) for the range of inverter and module-level power electronics products currently available? If not, how can better information be made available?

Low-Power Modes and Power Factor

Based on the issues identified and data presented in the Invitation to Participate, the Energy Commission would like to see roadmap proposals that address the following questions:

1. Should power factor and low-power modes be treated together in the same roadmap or should two separate roadmaps be developed? Should the product clusters align if the roadmaps are separated? What are the advantages and disadvantages to your proposed approach?

2. What are the products that would be included in each cluster? What is the best size for each category? For example, should we assign a category for all connected edge devices or should we break this into several smaller categories such as connected lighting devices, connected audio and video devices, connected heating and cooling devices, etc.?

3. What should be characteristics of different clusters of products that can be grouped together to evaluate low-power-mode performance? In other words, what should be the main function in the low-power mode among the devices in each group (the horizontal function)? Examples include searching for infrared light signal of a remote control, or sensor signals of a security camera.

4. What are possible additional functionalities of products in each group that require additional power consumption allowances in low-power mode (the vertical functions)? For example, maintaining clock function while the security cameras are in standby mode to stamp the time of the recordings.

5. Different groups of products might have different types of low-power modes. These low-power modes should be determined and defined for each group of products. What are the different types of low-power modes (standby "active," standby "passive," off) for each group of products?

6. What should be the proposed targets and milestones for efficiency (including base levels for horizontal function and adders for vertical function(s)) for each product cluster? These targets or milestones should also include proposed pathways to improve the energy efficiency for each cluster of products or examples of models of the same products that are more energy efficient with the same or better utility and performance.

7. What are technical barriers to improved efficiency and technical solutions to achieve efficiency levels? In particular, specify whether increased energy efficiency for each group of products has an adverse impact to their utility; if it does, propose solutions. For example, latency can significantly impact the expected utility of small network equipment; what are ways to decrease latency while improving efficiency?

8. What are proposed test procedures for each cluster or product within that cluster (for both test setup and measurements)? Specify the metrics used for each cluster to evaluate efficiency.

9. What research and development is needed to further improve the efficiency of each cluster or product within the cluster?

10. How can the Energy Commission track whether roadmap goals or milestones are being met?

11. What are the benefits of power factor correction and who receives those benefits?

12. Are correcting both kinds of power factor, displacement and harmonic distortion, equally beneficial? To whom?

13. What research and development is needed to better quantify the benefits of power factor correction?